

SURFACE PREPARATION PRIOR TO DEPOSITION

Abstract of the Disclosure

Methods are provided herein for treating substrate surfaces in preparation for subsequent nucleation-sensitive depositions (*e.g.*, polysilicon or poly-SiGe) and adsorption-driven deposition (*e.g.* atomic layer deposition or ALD). Prior to depositing, the surface is treated with non-depositing plasma products. The treated surface more readily nucleates polysilicon and poly-SiGe (such as for a gate electrode), or more readily adsorbs ALD reactants (such as for a gate dielectric). The surface treatment provides surface moieties more readily susceptible to a subsequent deposition reaction, or more readily susceptible to further surface treatment prior to deposition. By changing the surface termination of the substrate with a low temperature radical treatment, subsequent deposition is advantageously facilitated without depositing a layer of any appreciable thickness and without significantly affecting the bulk properties of the underlying material. Preferably less than 10 Å of the bulk material incorporates the excited species, which can include fluorine, chlorine and particularly nitrogen excited species.

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